SERVICE CONDITIONS OF PASSENGERS ON SUBURBAN BUS STATIONS AND THEIR INFLUENCE ON THE TRANSPORT FATIGUE

page 4–7

The use of the index evaluation of transport fatigue of passengers with the task of organizing the transport of passengers in suburban traffic is discussed in the article and some results of our research in this area are given. The main aim of the investigation is to identify the patterns of influence of the conditions of passengers waiting for their transport fatigue. The use of statistical methods to assess complex objects allows to take into account the interests of both carriers and passengers during development of process the carriage of passengers on suburban routes. The method of estimating the transport fatigue of the passenger by determining the activity of regulatory systems of his body is discussed in the article. Results of field studies have established the influence of age of passenger and waiting time at the value of its index of activity of regulatory systems. The developed regression model of the change in the activity of regulatory systems of passenger allows to estimate the change in transport fatigue of passengers standing by waiting vehicles. This makes it possible to assess various design options of suburban bus station with accounting the technological process parameters and passengers. The research results can be applied by transport specialists involved in the organization of passenger transportation in suburban traffic.

Keywords: transport service, suburban traffic, transport fatigue, conditions of waiting, waiting time.

References

1. *Transportna systema Ukrainy*. Available: http://www.geograf.com.ua/human/school-course/409-transportna-sistemaukrajini
2. Yanovskyi, P. O. (2008). *Pasazhyrski perevezennia*. Kyiv: NAU, 469.
3. Vakarchuk, I. M. (2006). *Upravlinnia proektamy ta prohramamy pobudovy prymiskykh avtobusnykh system*. K.: NTU, 235.
4. Permovskii, A. A. (2011). *Passazhirskie perevozki*. N. Novgorod: NGPU, 164.
5. Dolia, V. K. (2011). *Pasazhyrski perevezennia*. Kh.: Vydavnytstvo «Fort», 504.
6. Matantseva, O. Yu. (1988). Analiz mehanizma priniatiia reshenii pri organizatsii avtobusnyh perevozok. *Sovershenstvovanie organizatsii i upravleniia perevozochnym protsessom na passazhirskom avtomobil'nom transporte*. M.: NIIAT, 100–107.
7. Nuzzolo, A., Russo, F., Crisalli, U. (2001, August). A Doubly Dynamic Schedule-based Assignment Model for Transit Networks. *Transportation Science, Vol. 35, № 3*, 268–285. doi:10.1287/trsc.35.3.268.10149
8. Tong, C. O., Wong, S. C. (1999, June). A schedule-based time-dependent trip assignment model for transit networks. *Journal of Advanced Transportation, Vol. 33, № 3*, 371–388. doi:10.1002/atr.5670330307
9. Lam, W. H. K., Gao, Z. Y., Chan, K. S., Yang, H. (1999, June). A stochastic user equilibrium assignment model for congested transit networks. *Transportation Research Part B: Methodological, Vol. 33, № 5*, 351–368. doi:10.1016/s0191-2615(98)00040-x
10. Spiess, H., Florian, M. (1989, April). Optimal strategies: A new assignment model for transit networks. *Transportation Research Part B: Methodological, Vol. 23, № 2*, 83–102. doi:10.1016/0191-2615(89)90034-9
11. Cepeda, M., Cominetti, R., Florian, M. (2006, July). A frequency-based assignment model for congested transit networks with strict capacity constraints: characterization and computation of equilibria. *Transportation Research Part B: Methodological, Vol. 40, № 6*, 437–459. doi:10.1016/j.trb.2005.05.006
12. Wu, J. H., Florian, M., Marcotte, P. (1994, August). Transit Equilibrium Assignment: A Model and Solution Algorithms. *Transportation Science, Vol. 28, № 3*, 193–203. doi:10.1287/trsc.28.3.193
13. Ponkratov, D. P., Faletska, H. I. (2014). Otsinka znachushchosti kryteriiv vyboru pasazhyramy shliakhu peresuvannia u mistakh. *Naukovi notatky. Mizhvuzivskyi zbirnyk, 46*, 452–459.
14. Efremov, I. S., Kobozev, V. M., Yudin, V. A. (1980). *Teoriia gorodskih passazhirskih perevozok*. M.: Vyssh. shkola, 535.
15. In: Vinogradov, M. I. (1969). *Rukovodstvo po fiziologii truda*. M.: Meditsina, 408.
16. In: Medvediev, V. I. (1984). *Fiziologicheskie printsipy razrabotki rezhimov truda i otdyha*. L.: Nauka, 140.
17. Giulev, N. U. (1993). *Vybor ratsional'nogo kolichestva avtobusov na marshrutah goroda s uchetom vliianiia chelovecheskogo faktora*. Kh.: KhADI, 174.
18. Baevskii, R. M. (1984). *Matematicheskii analiz izmenenii serdechnogo ritma pri stresse*. M.: Nauka, 222.
19. Galushko, V. G. (1976). *Veroiatnostno-statisticheskie metody na avtotransporte*. Kiev: Vishcha shkola, 232.

DEVELOPMENT OF NONLINEAR MATHEMATICAL MODELS OF TRANSPORT UTILIZATION RATE

page 8–12

A number of recent studies show that the organization and planning of urban passenger transport consists in adequate calculation or prediction of labor movements between individual and public transport.

Previously it was believed that meet of potential mobility carried on transport and on foot. So today we have a need to define the function of transport utilization rate and urban passenger transport utilization rate on a combination of factors, using different percentages between the main groups of people.

This article was grouped main factors influencing transport mobility, according to foreign and domestic research and obtained during the survey of urban residents.

As a result of the research it was obtained data set using transport utilization rate and urban passenger transport utilization rate for all cities covered by the investigation at different ratios of proposed factors. Revealed set of factors influencing the transport mobility allows to fully estimate the distribution of urban residents travel between individual and public transport.

Keywords: population mobility, passenger transport, questionnaire-interview, level of motorization, factor analysis.

References

1. Rao, D. P., Murthy, K. S. (1997). *Urban passenger transportation*. Inter-India Publications, 416.
2. Banister, D. (2002). *Transport Planning*. Spon Press, 317. doi:10.4324/9780203449462
3. Simpson, B. J. (2003). *Urban public transport today*. E&FN Spon, 222. doi:10.4324/9780203362235
4. Iles, R. (2005). *Public Transport in Developing Countries*. Elsevier, 478.
5. Efremov, I., Kobozev, V., Yudin, V. (1980). *The theory of urban passenger transport*. Moscow: Higher School, 535.
6. Dolya, V. (2011). *Passenger traffic*. Kharkiv: Publisher «Fort», 507.
7. Gudkov, V., Mirotin, L. (1997). *Technology, organization and management of passenger road transport*. Moscow: Transport, 254.
8. Spirin, I. (2003). *Organization and management of passenger road transport*. Moscow: Academy, 400.
9. Ignatenko, A. (1998). *Organization of bus transportation in cities*. Kyiv: UTU, 400.
10. Kim, S. (2011, September). Assessing mobility in an aging society: Personal and built environment factors associated with older people's subjective transportation deficiency in the US. *Transportation Research Part F: Traffic Psychology and Behaviour, Vol. 14, № 5*, 422–429. doi:10.1016/j.trf.2011.04.011
11. Frändberg, L., Vilhelmson, B. (2011, November). More or less travel: personal mobility trends in the Swedish population focusing gender and cohort. *Journal of Transport Geography, Vol. 19, № 6*, 1235–1244. doi:10.1016/j.jtrangeo.2011.06.004
12. Bocarejo S., J. P., Oviedo H., D. R. (2012, September). Transport accessibility and social inequities: a tool for identification of mobility needs and evaluation of transport investments. *Journal of Transport Geography, Vol. 24*, 142–154. doi:10.1016/j.jtrangeo.2011.12.004
13. Aftabuzzaman, M., Mazloumi, E. (2011, September). Achieving sustainable urban transport mobility in post peak oil era. *Transport Policy, Vol. 18, № 5*, 695–702. doi:10.1016/j.tranpol.2011.01.004
14. Mattson, J. (2012). *Travel Behavior and Mobility of Transportation-Disadvantaged Populations: Evidence from the National Household Travel Survey*. Fargo, 49.
15. Havrylov, E. V., Dmytrychenko, M. F., Dolia, V. K. et al; in: Dmytrychenko, M. F. (2007). *Systemology transport. Technology research and technical work*. Kyiv: Knowledge of Ukraine, 318.
16. Ivanov, I. (2014). Determination of the use of transport in urban movements. *Collected Works of Ukrainian State Academy of Railway Transport, 148, Part 1*, 187–191.

RISKS MANAGEMENT OF SERIAL PROJECTS' TRANSFORMATION INTO OPERATIONAL ACTIVITIES

page 12–17

Implemented is the project activity analysis at the serial projects' transformation into operational activity risks management stage. The measures aimed onto this process slowing can vary significantly. From one side, the problem can be solved through the transformation velocity slowing. The article represents two approaches to prevent the essential transformation of serial project activity into operational one due to the lowering of diffusion velocity of absorbing layer into variative and creative ones. The suggested methods of preventing from undesired transformation constituted the basis of project decisions-making maintenance information system, used while managing programs including serial projects. Revealed is that such system application allows to arrange in respective order the interaction to the turbulent environment as the same time that to maintain the required share of projects' variative part while process running.

Keyword: serial program, project activity restoring, risks management, natural and artificial risks.

References

1. *Rukovodstvo k Svodu znanii po upravleniiu proektami*. (2004). Amerikanskii natsional'nyi standart ANSI/PMI 99-001-2004. Ed. 3. Project Management Institute, 388.
2. Bushuyev, S. D., Sochnev, S. V. (1999, December). Entropy measurement as a project control tool. *International Journal of Project Management, Vol. 17, № 6*, 343–350. doi:10.1016/s0263-7863(98)00049-0
3. Danchenko, E. B. (2013). Integrirovannyiy analiz riskov i izmeneniy proekta s pomoschyu metoda dereva resheniy. *Materialy X Mizhnarodnoi naukovo-praktychnoi konferentsii «Upravlinnia proektamy: stan ta perspektyvy»*. Mikolayiv: NUK, 92–94.
4. Chernov, S. K. (2006). Uchet riskov i neopredelennostey v organizatsionnyih proektah. *Upravlinnia proektamy ta rozvytok vyrobnytstva, 1(17)*, 41–44.
5. Gracheva, M. V. (1999). *Analiz proektnyih riskov*. M.: ZAO «Finstatinform», 216.
6. Gogunskii, V., Stanovskaia, S., Gur'ev, I. (2013). Bushuyev law – the guarantee of incomplete transformation of serial projects in operating activities. *Eastern-European Journal Of Enterprise Technologies, 4(3(64))*, 41–44. Available: http://journals.uran.ua/eejet/article/view/16279
7. Bushuiev, S. D., Yaroshenko, Yu. F. (2013). Antykryzove upravlinnia finansovymy ustanovamy v umovakh turbulentnosti. *Upravlinnia rozvytkom skladnykh system, 15*, 5–10.
8. Fleming, Q. W., Hoppelman, J. M. (1996). *Earned value Project Management*. N.Y.: Project Management Institure, 141.
9. Shapiro, V. D., Mazur, I. I., Olderogge, N. G. (1996). *Upravlenie proektami*. SPb.: DvaTrI, 664.
10. Ramingwong, S., Ramingwong, L. (2009, June 18). The Paradoxical Relationships of Risks and Benefits in Offshore Outsourcing of Software Projects. *The Open Software Engineering Journal, Vol. 3, № 1*, 35–38. doi:10.2174/1874107x00903010035
11. Schmidt, R., Lyytinen, K., Keil, M., Cule, P. (2001). Identifying software project risks. An international Delphi study. *Journal of Management Information Systems, 7(4)*, 5–36.
12. Aron, R., Clemons, E. K., Reddi, S. (2005). Just right outsourcing: understanding and managing risk. *Journal of Management Information Systems, 22(2)*, 37–52.

INFLUENCE OF THE FACTORS OF THE AVIATION ENTERPRISE'S MANAGEMENT ENVIRONMENT ON THE SAFETY OF AVIATION ACTIVITY

page 17–24

International Civil Aviation Organization (ICAO) requires further improvement based on the risk assessment methods which focused on further quantity reduction of aviation accidents in the world. The modern approach gives us an opportunity to verify different objects and subjects of aviation as a single system. For this reason, today, it is very important to investigate the combined influence of inhomogeneous factors of internal and external management environment of aviation enterprise on the aviation safety and to identify all the risk factors.

The structural analysis of management environment of aviation enterprise was carried out. And, as follows it from the analysis, inhomogeneous factors which influence the aviation activity were classified and formalized:

– factors of internal management environment of aviation enterprise (goals, tasks, structures, technology and personnel);

– factors of external management environment of aviation enterprise of direct influence (consumers, competitors, partners, laws and authorities)

– factors of external management environment of aviation enterprise of indirect influence (economic situation, progress in science and technology, political factors, sociocultural factors, international events).

Hierarchic composition of priorities is based on the example of «Technology» – factor of internal management environment of aviation enterprise.

Set-theoretical approach was suggested in order to generalize the inhomogeneous factors of management environment of aviation enterprise. It allows to take into account structural hierarchical pattern, inhomogeneity, dynamic instability and to define conditions for their estimation.

The variables of significance were obtained with the help of expert estimation. The variables show the influence of parameters of factors of internal and external management environment on aviation safety. It was determined that the aircraft performance characteristics among the parameters of factor of internal management environment «Technology» have the greatest influence. The level of vehicles, buildings and constructions dilapidation as well as technological operations on airport servicing have the lowest influence.

The value of multiplicative function of estimation of parameters of factor of internal management environment «Technology» was obtained while aviation enterprise examination.

Estimation method of influence of inhomogeneous factors of management environment of aviation security will be applied to the «Passports of aviation safety». The passport will be used by the State Aviation Service of Ukraine for the quantative evaluation during audits aviation companies.

Keywords: risk factors, management environment, decomposition, hierarchy analysis, experts' opinions.

References

1. *Normal Operations Safety Survey (NOSS)*. (2008). Doc. 9910-AN 473. Canada, Montreal: ICAO, 85.
2. *Global Aviation Safety Study: A review of 60 years of improvement in aviation safety*. (2014). USA: Allianz Global Corporate & Specialty; EMBRY-RIDDLE Aeronautical University, 63.
3. *ICAO Safety Report*. (2014). Canada, Montreal: ICAO, 35.
4. Aviation Safety Network. An exclusive service of Flight Safety Foundation. *Despite high profile accidents, 2014 was the safest year ever according to ASN data*. Available: http://news.aviation-safety.net/2015/01/01/despite-high-profile-accidents-2014-was-the-safest-year-ever-according-to-asn-data/. Last accessed: March 2015.
5. *Manual on Global Performance of the Air Navigation System*. (2009). Doc. 9883. Canada, Montreal: ICAO, 176.
6. Air Code of Ukraine. (2011). Resolution of the Supreme Council of 19.05.2011 p. № 3393-VI. *Supreme Council of Ukraine, № 48–49, Art. 536*. Available: http://zakon2.rada.gov.ua/laws/show/3393-17
7. *Safety Management Manual (SMM)*. (2013). Doc. 9859-AN 474. Ed. 3. Canada, Montreal: ICAO, 251.
8. Mescon, M., Albert, M., Khedouri, F. (1984). *Management*. USA, New York: HarperCollins Publishers, 777.
9. Thematic catalog on Ukrainian language – a Complete List of Dissertations Protected in Ukraine from 2002 to 2012. (2015). *Dissertations of Ukraine: Informational Support of Educational and Research Activities*. Available: http://диссертации.com.ua. Last accessed: March 2015.
10. Saaty, T. (1980). *Analytic Hierarchy Process Planning, Priority Setting, Resource Allcation*. USA, New York: McGraw-Hill, 278.
11. Shmelova, T., Sikirda, Y., Sunduchkov, K. (2013). Socio-Technical Analysis of Air Navigation System. *Science and technology of the Air Force of Ukraine, 4(13)*, 34–39.
12. Assaul, A., Sikirda, Y., Stasyuk, O., Shmelova, T. (2014). Determining the Influence of Factors of Internal and External Environment

of Management on the Level of Safety of Aviation Enterprise. *Safety in Aviation And Space Technologies : Proceedings the Six World Congress «Aviation in the XXI-st century», Kyiv, Sept. 23–25, V. 2*. K.: National Aviation University, 3.1.1–3.1.5.

FACTOR-TARGET ANALYSIS OF MULTI-TARGET CONTROL OF BREWING TECHNOLOGICAL COMPLEX FUNCTIONING

page 24–30

The work is devoted to the issue of optimization of basic technological processes in beer production. A causal-target and factor-target analysis of the technological complex of the brewery was made, taking into account the mutual influence of the individual processes. We used the methods of factor analysis and cognitive modeling, which allowed to determine the set of attributes, flows, factors, life conditions of the brewery as an object of control and to form the structure of interaction between objects and factors. Factor-target analysis of the system was implemented on the basis of the expert survey using multidimensional scaling method for the further development of the scenario control system of technological complex of the brewery. Causal-target and factor-target diagrams for the process of brewing are given. The studies will help to better define the primary and secondary factors affecting the quality of the final product and resources usage. Scenario control system of beer making process will be established on the basis of the obtained data.

Keywords: optimization of beer production, factor analysis, situational changing, Ishikawa diagram.

References

1. Kuntse, V., Mit, G. (2001). *Tehnologiia soloda i piva*. Translated from German. SPb: «Professiia», 912.
2. Domaretskyi, V. A., Prybylskyi, V. L., Mykhailov, M. H. (2005). *Tekhnolohiia ekstraktiv, kontsentrativ ta napoiv iz roslynnoi syrovyny*. K.: Nova Knyha, 408.
3. Meletiev, A. Ye., Todosiichuk, S. R., Koshova, V. M. (2007). *Tekhnokhimichnyi kontrol vyrobnytstva solodu, pyva i bezalkoholnykh napoiv*. K.: Nova knyha, 385.
4. Novosel'tsev, V. I., Tarasov, B. V., Golikov, V. K., Demin, B. E. (2006). *Teoreticheskie osnovy sistemnogo analiza*. M.: Maior, 592.
5. Anderson, R. C., Barnett, M., Jaisinghani, R. (2005, October). Rule-driven optimization boosts plant performance. *Hydrocarbon Proces*sing. Available: http://www.hydrocarbonprocessing.com/Article/2598830/Rule-driven-optimization-boosts-plant-performance.html
6. O'Konnor, J., Makdermott, Ia. (2006). *Iskusstvo sistemnogo myshleniia: Neobhodimye znaniia o sistemah i tvorcheskom podhode k resheniiu problem*. Translated from English. M.: Al'pina Biznes Buks, 256.
7. Rogov, E. V. (2001). Arhitektura sistemy analiza i obrabotki dannyh o povedenii protsessov. *Vestnik Moskovskogo universiteta. Ser. 15. Vychisl. matem. i kibern., № 4*, 36–45.
8. Sharuda, S. S., Kyshenko, V. D. (2008). Linhvistychna aproksymatsiia tekhnolohichnykh pokaznykiv khlibopekarskoho vyrobnytstva. *Shtuchnyi intelekt, № 4*, 188–193.
9. Tolstova, Yu. N. (2006). *Osnovy mnogomernogo shkalirovaniia*. M.: KDU, 160.
10. Maksimov, V. I. (2001). Kognitivnyi analiz i upravlenie razvitiem situatsii. *Materialy 1-i mezhdunar. konferentsii, Vol. 2*. M.: Institut problem upravleniia RAN, 10–22.
11. Eremeev, A. P., Troitskii, V. V. (2003). Modeli predstavleniia vremennyh zavisimostei v intellektual nyh sistemah podderzhki priniatiia reshenii. *Izvestiia RAN. TiSU, № 5*, 75–88.
12. Yuditskii, S. A., Vladislavlev, P. N. (2002). Tehnologiia vybora tselei pri proektirovanii biznes sistem. *Pribory i sistemy upravleniia, № 12*, 60–66.
13. Kulinich, A. A. (2002). Sistema modelirovaniia ploho opredelennyh nestatsionarnyh situatsii. *Trudy vtoroi mezhdunarodnoi konferentsii «Kognitivnyi analiz i upravlenie razvitiem situatsii»*. M.: IPU RAN, 44–50.
14. Kulinich, A. A. (2003). Metodologiia kognitivnogo modelirovaniia slozhnyh ploho opredelennyh situatsii. *Izbrannye trudy vtoroi mezhdunarodnoi konferentsii po problemam upravleniia,17–19 iiunia 2003 g.* M.: IPU RAN, 219–226.

OCCURRENCE OF NONLINEAR EFFECTS IN THE SUSPENSION OF FLOATING GYROSCOPE

page 30–33

It is built the refined model of the elastic interaction of penetrating acoustic radiation with float gyroscope to detect non-linear effects of resonant type in the suspension at the operational use of the gyroscope.

It is investigated the cylindrical shell part of device case, computational model of which is built in the form of elastic compliance shell with acoustic impedance.

The regularity of elastic radial displacements of the material of device body in the radial direction is determined and its acoustic permeability in a hypersonic flight is defined. The conditions for the appearance of «acoustic transparency» of the case in the event of resonance overlap are outlined.

An application area in suborbital and atmospheric hypersonic technology at forming initiation of the resonance overlap in the suspension of gyroscope, leading to the onset of the «acoustic transparency» of the body.

The obtained results can serve as the basis of decision-making in the selection of design models of investigated effects from the perspective of pending outline of wave size in hypersonic flight operating conditions and ensuring the appropriate choice of impedance of the body material.

Keywords: float gyroscope, nonlinear effects, resonance overlap, design models.

References

1. Ishlinskij, A. Y. (1976). *Orientation, gyroscopes and inertial navigation*. Moscow, USSR: Nauka, 672.
2. Feodosyev, V. I., Sinyarev, G. B. (1969). *Introduction to rocket technology*. Moscow, USSR: Defense Publishing, 506.
3. Wrigley, W., Hollister, W., Denhardt, W. (1972). *The theory, design and testing of gyroscopes*. Translated from English. Moscow, USSR: Mir, 416.
4. Mel'nick, V. N., Karachun, V. V. (2013). *Hypersonic technology and some navigation problems*. Kyiv, Ukraine: Korniychuk, 152.
5. Boyko, G. (2013). Linearly elastic suspension of the float gyroscope in the acoustic field. *Technology Audit And Production Reserves, 6(1(14))*, 7–10. Available: http://journals.uran.ua/tarp/article/view/19534
6. Boiko, G. V. (2013). Additional error of floating gyroscope under flight manual. *Proceedings of the All-Ukrainian scientific-practical conference of young scientists «Problems of navigation and motion control»*. Kyiv: NAU, 85.
7. Shybetskyy, V. U. (2013). Euler inertial forces in noninertional coordinates of float gyroscope suspension. *VIII International scientific and practical. conf. «Science and innovation-2013»*. Poland, Przemysl, 90–92.
8. Kosova, V. P. (2012). Supersonic flight and gyro error float. *Proceedings of the International Scientific Conference «Achievement of high school-2012», Vol. 26. Technology*. Sofia: «Byal GRAD-BG» LTD, 30–32.
9. Karachun, V., Mel'nick, V. (2010). Wave tasks of inertial navigation. *Eastern-European Journal Of Enterprise Technologies, 6(3(48))*, 16–20. Available: http://journals.uran.ua/eejet/article/view/3238
10. Karachun, V. V., Mel'nik, V. N. (2012, July). Influence of diffraction effects on the inertial sensors of a gyroscopically stabilized platform: three-dimensional problem. *International Applied Mechanics, Vol. 48, № 4*, 458–464. doi:10.1007/s10778-012-0533-y
11. Karachun, V. V., Mel'nik, V. N. (2012, November). Elastic stress state of a floating-type suspension in the acoustic field. *Deviation of the spin axis. Strength of Materials, Vol. 44, № 6*, 668–677. doi:10.1007/s11223-012-9421-2.

CRITERIA SYSTEM OF FORMATION OF SPECTRAL CHANNELS OF MULTICHANNEL RADIATION THERMOMETER

page 34–38

Today, methods for measuring the radiation temperature depending on the number of spectral bands that used for their implementation can be divided into single-band and multi-band. Development

of multi-band methods is perspective for measuring radiation temperature because their use is aimed at reducing the methodical error of measurement of radiation temperature through the use of spectral information of radioactive properties of the object. For its current implementation it is actual the development of multi-radiation thermometers with multiple spectral channels. To implement the multichannel methods by multi-channel radiation thermometers it is proposed set of criteria for the formation of spectral channels: criteria for forming signal of separate spectral channel; criteria of relative position of spectral channels; criteria for selection of spectral channels, depending on the method of multi-channel radiation thermometry. Requirements for the implementation of these criteria are formed.

As a result, we can say that requirements based on defined criteria are formulated for spectral bands of radiation thermometer and determined the optimal parameters of spectral channels of multichannel radiation thermometer used in a spectral and temperature range and implements appropriate methods for measuring the radiation temperature. The implementation of these requirements together optimally determine the parameters of spectral channels of multi-channel radiation thermometer, which operates in a spectral and temperature range and implements appropriate methods for measuring the radiation temperature.

Keywords: multi-channel radiation thermometer, multi-band measuring methods of radiation temperature, infrared radiation.

References

1. Snopko, V. N. (1988). *Spektral'nye metody opticheskoi pirometrii nagretoi poverhnosti*. Minsk: Nauka i tehnika, 248.
2. Snopko, V. N. (1993). *Shirokospektral'naia opticheskaia pirometriia. Chast'1*. Minsk, 26.
3. Svet, D. Ya. (1982). *Opticheskie metody izmereniia istinnyh temperatur*. M.: Nauka, 296.
4. Hots, N. Ye. (2011). Modeliuvannia pokhybok vymiriuvannia temperatury za vyprominenniam bahatokanalnymy metodamy. *Visnyk Natsionalnoho universytetu «Lvivska politekhnika». Kompiuterni nauky ta informatsiini tekhnolohii, № 710*, 107–112.
5. Hots, N., Piątkowski, T. (2009). Analiza czynników składowych błędów pirometrii radiacyjnej. *Pomiary. Automatyka. Kontrola, № 11*, 874–877.
6. Coates, P. B. (1981, July). Multi-Wavelength Pyrometry. *Metrologia, Vol. 17, № 3*, 103–109. doi:10.1088/0026-1394/17/3/006
7. Duvaut, T., Georgeault, D., Beaudoin, J. L. (1995, December). Multiwavelength infrared pyrometry: optimization and computer simulations. *Infrared Physics & Technology, Vol. 36, № 7*, 1089–1103. doi:10.1016/1350-4495(95)00040-2
8. Fu, T., Cheng, X., Fan, X., Ding, J. (2004, June 12). The analysis of optimization criteria for multi-band pyrometry. *Metrologia, Vol. 41, № 4*, 305–313. doi:10.1088/0026-1394/41/4/012
9. Hots, N. E. (2007). Sravnitel'naia harakteristika metodov pirometrii. *Pribory + Avtomatika, № 7(85)*, 35–50.
10. Rogalski, A. (2002, June). Infrared detectors: an overview. *Infrared Physics & Technology, Vol. 43, № 3–5*, 187–210. doi:10.1016/s1350-4495(02)00140-8

DEVELOPMENT OF OBJECT MODEL OF THE GENERALIZED CONFIGURATION MANAGEMENT PROCESS IN PROJECT MANAGEMENT

page 38–44

Almost inevitable changes in external and internal environment of the project leads to the problem of consistency support the project and its results, i. e. the product of the project. The essence of the problem lies in the fact that the lack of control over changes to the object, the values of the characteristics which cause the values of the characteristics of other objects can lead to mismatch of characteristic values of dependent objects. Because of this mismatch may be exceeded or completion dates of the project budget. In this investigation it is developed a mathematical model of the object of the process of the configuration management — the model of controlled object. A feature of this model is its versatility in relation to the kind of object. So, using the presented model, it can be formalized both tangible and intangible objects controlled by the process of the configuration management. The underlying concepts of configuration management sector are mathematically described. Such concepts are: characteristics, current and consistent state characteristics, specifications change, consistency relation, object, current and consistent state of the object, changing the subject. It is identified and described the mathematical object «object consistency map», which is a directed graph built on the binary relations, reflecting the ratio of consistency between the characteristics of the controlled object, and those characteristics that affect the consistency of the object. The results can be used to develop a mathematical model of configuration management of an object and its further optimization for efficient implementation.

Keywords: configuration, configuration management, object, project, process, optimization.

References

1. *Rukovodstvo k Svodu znanii po upravleniiu proektami*. (2004). Amerikanskii natsional'nyi standart ANSI/PMI 99-001-2004. Ed. 3. Project Management Institute, 388.
2. *Practice Standard for Project Configuration Management*. (2007). USA: Project Management Institute, 53.
3. *MIL-HDBK-61. Military Handbook. Configuration Management Guidance*. (2001, February 7). USA: Department of Defense. Available: http://acqnotes.com/Attachments/MIL-HDBK-61A%20(SE) Configuration%20Management%20Guidance.pdf
4. *ANSI/EIA 649-B — Configuration Management Standard*. (2011). TechAmerica. Available: http://ru.scribd.com/doc/191119436/Configuration-Management-Standard-EIA-649-B-CM-Std#scribd
5. *ISO 10007. Quality management. Guidelines for configuration management*. (1996). International Organization for Standardization, 14. doi:10.3403/01143454
6. Morozov, V., Rudnytskyy, S. (2013). Conceptual model of the configuration management process in projects. *Eastern-European Journal Of Enterprise Technologies, 1(10(61))*, 187–193. Available: http://journals.uran.ua/eejet/article/view/6766
7. Ratushnyi, R. T. (2005). *Metody ta modeli upravlinnia konfihuratsiieiu proektu vdoskonalennia systemy pozhezhohasinnia v silskomu administratyvnomu raioni (na prykladi Lvivskoi oblasti)*. Lviv, 19.
8. Sydorchuk, L. L. (2008). *Identyfikatsiia konfihuratsii parku kombainiv u proektakh system tsentralizovanoho zbyrannia rannikh zernovykh kultur*. Lviv, 18.
9. Naliutin, N. Yu. (2008). *Metody i programmnye sredstva upravleniia konfiguratsiiami proektov razrabotki vstroennyh sistem*. Moskva, 226.
10. Rudnitskyy, S. (2015). Object configuration management process. *Eastern-European Journal Of Enterprise Technologies, 2(3(74))*, 15–25. doi:10.15587/1729-4061.2015.39788
11. *IEEE Std 828-2005, IEEE Standard for Software Configuration Management Plans*. (2005). New York: IEEE Computer Society. Available: http://dis.unal.edu.co/~icasta/ggs/Documentos/Normas/828-2005.pdf
12. Morozov, V. V., Rudnytskyy, S. Y. (2014). Formalyzatsyia protsessa ydentyfykatsyy konfyhuratsyy proekta. *Visnyk NTU «KhPI». Seriia: Stratehichne upravlinnia, upravlinnia portfeliamy, prohramamy ta proektamy, 2(1045)*, 58–70.
13. Vann, J. M. (1996). *TWRS Configuration management program plan*. United States. Available: http://dx.doi.org/10.2172/662064
14. Reilly, M. A. (1995). *Spent Nuclear Fuel Project Configuration Management Plan*. United States. Available: http://dx.doi.org/10.2172/97000
15. Moran, A. (2015). Configuration Management. *Managing Agile*. Springer Science + Business Media, 173–184. doi:10.1007/978-3-319-16262-1_9

STRUCTURAL MODELING OF THE PRODUCTION QUALITY AS A MULTIDIMENSIONAL OBJECT OF MEASUREMENT AND CONTROL

page 44–48

The structural-analytical models of product quality as a multidimensional process of evaluation, measurement and control are developed. The product quality is represented as a multi-factor, multi-criteria and multi-parameter estimation object. This structural formalization of quality demonstrates the multidimensional qualities: comprehensiveness due to a set of environmental factors; multicriteriality due collectively evaluated quality criteria; multiparameter information models that describe the relationship between the factors

and evaluated criteria. The developed models allow us to establish the relationship between the structural elements of the formation of the product quality.

The advantages of neural network modeling to quantify and data quality assurance are proved. Using the level of formality of quality control processes based on advanced intelligent technologies allows creating a computational and experimental base of automated problem solving of information quality and reducing the cost of development, testing and manufacture of product.

Keywords: product quality, multi-dimensional, structural modeling, process of quality evaluation, information support.

References

1. Zubretska, N. A. (2012). Kontseptualna model systemy informatsiinoho zabezpechennia yakosti promyslovoi produktsii. *Visnyk KNUTD, 3*, 68–74.
2. Fedin, S. S., Zubretskaya, N. A. (2012). *Otsenka i prognozirovanie kachestva promyshlennoi produktsii s ispol'zovaniem adaptivnyh sistem iskusstvennogo intellekta*. K.: Interservis, 206.
3. Boguslaev, A. V. et al.; In: Pavlenko, D. V., Subbotin, S. A. (2009). *Progressivnye tehnologii modelirovaniia, optimizatsii i intellektual'noi avtomatizatsii etapov zhiznennogo tsikla aviatsionnyh dvigatelei*. Zaporozh'e: Motor Sich, 468.
4. Borisov, V. V., Kruglov, V. V., Fedulov, A. S. (2007). *Nechetkie modeli i seti*. M.: Goriachaia liniia — Telekom, 284.
5. Dolgov, M. A., Buketova, N. M., Zubrets'ka, N. A. (2012, March). On the problem of modeling adhesive strength of protective coating depending on the content and conditions of formation of composition. *Strength of Materials, Vol. 44, № 2*, 212–217. doi:10.1007/s11223-012-9374-5
6. Bouzeghoub, M., Kedad, Z. (2002). Quality in Data Warehousing. *Advances in Database Systems*. Springer Science + Business Media, 163–198. doi:10.1007/978-1-4615-0831-1_8
7. Pedersen, T. B., Jensen, C. S. (2001). Multidimensional database technology. *Computer, Vol. 34, № 12*, 40–46. doi:10.1109/2.970558
8. Pedersen, T. B., Jensen, C. S., Dyreson, C. E. (2001, July). A foundation for capturing and querying complex multidimensional data. *Information Systems, Vol. 26, № 5*, 383–423. doi:10.1016/s0306-4379(01)00023-0
9. Gilev, S. E., Gorban, A. N. (1996). On Completeness Of The Class Of Functions Computable By Neural Networks. *Proc. of the World Congress on Neural Networks (WCNN'96), CA, Lawrens Erlbaum Accociates*, 984–991.
10. Hornik, K., Stinchcombe, M., White, H. (1989, January). Multilayer feedforward networks are universal approximators. *Neural Networks, Vol. 2, № 5*, 359–366. doi:10.1016/0893-6080(89)90020-8

RESEARCH OF THE INFLUENCE OF TRAFFIC CONGESTION ON THE FUNCTIONAL STATE OF DRIVER

page 48–51

Reliability of the functioning the transport system of city mainly depends on the technology of used traffic management.

The main element of this system is the driver, the strategy of behavior of which is depended on the safety of the system.

Traffic congestion that arising from the use of improper traffic management technology or due to excess traffic on road capacity, result in a change of psychophysiological state of the driver. The vast majority of drivers are experiencing the negative impact of traffic congestion, manifested in the deterioration of their functional state.

This article first presents a model of changes in the functional state of the average driver. The study involved drivers of all major types of temperaments. At the same time it is pointed out that one of the most negative factors of violation of traffic management technology is traffic congestion. It is noted that not all members of the temperaments deteriorating functional status. Phlegmatic drivers are relative to this group.

It is emphasized that the effects of congestion for the vast majority of drivers are manifested as a change in their reaction time and largely determine the safety of road users in general.

Keywords: regression equation, psychophysiological state, traffic congestion, transport system, rate of activity of regulatory systems.

References

1. Vaisman, A. I. (1975). *Osnovnye problemy gigieny truda voditel'skogo sostava avtotransporta*. M., 37.
2. Lobanov, E. M. (1980). *Proektirovanie dorog i organizatsiia dvizheniia s uchetom psihofiziologii voditelia*. M.: Transport, 311.
3. Driu, D. (1972). *Teoriia transportnyh potokov i upravlenie imi*. M.: Transport, 423.
4. Vol, M., Martin, B. (1981). *Analiz transportnyh system*. M.: Transport, 514.
5. Gyulev, N. (2011). Ob izmenenii vremeni reaktsii voditelia vsledstvie prebyvaniia v transportnom zatore. *Vistnyk NTU «KhPI», 2*, 117–120.
6. Heit, F. (1966). *Matematicheskaia teoriia transportnyh potokov*. M.: Mir, 288.
7. Gavrilov, E. V., Dmitrichenko, M. F., Dolia, V. K.; In: Dmitrichenko, M. F. (2007). *Sistemologiia na transporti. Kn. IV. Organizatsiia dorozhn'ogo ruhu*. K.: Znannia Ukraini, 452.
8. Mishurin, V. M., Romanov, A. N., Ignatov, N. A. (1982). *Psihofiziologicheskie osnovy truda voditelei avtomobilei*. M.: MADI, 254.
9. Johannsen, G. (1976). Nebenaufgaben als Beansruchungsmebverfahren in Fahrzeugfuhrungsaufgaben. *Zeitschrift für Arbeitswissenschaft, 30*, 45–50.
10. Davidich, Yu. O. (2006). *Proektuvannia avtotransportnih tehnologichnih protsesiv z urahuvanniam psihofiziologii vodiia*. Kharkiv: KhNADU, 292.
11. Crave, I. E. (1972). Pilot's fatigue and emotional problems. *Fright Mag., 2*, 161–170.
12. Ha1e, H. B., Hartman, B. O., Datz, D. A. (1972). Phisiologic stress during 50 hour doublrew missins in C-141 aircraft. *Aerospace Med., 3*, 138–148.
13. Gyulev, N. (2012). Transport congestion influence model on the functional state of driver. *Eastern-European Journal Of Enterprise Technologies, 2(6(50))*, 73–75. Available: http://journals.uran.ua/eejet/article/view/1815
14. Frenkel', A. A. (1966). *Mnogofaktornye korreliatsionnye modeli proizvoditel'nosti truda*. M.: Ekonomika, 96.
15. Baevskii, R. M., Kirillov, O. N., Kletskin, S. Z. (1984). *Matematicheskii analiz izmenenii serdechnogo ritma pri stresse*. M.: Nauka, 222.
16. Mitropol'skii, A. K. (1971). *Tehnika statisticheskih vichislenii*. M.: Nauka, 576.
17. Voznesenskii, V. A. (1981). *Statisticheskie metody planirovaniia eksperimenta v tehniko-ekonomicheskih issledovaniiah*. M.: Finansy i statistika, 264.

STRESS RELAXATION OF PVC-O PIPES AT THE DEVICE FOR MANUFACTURING PVC-O PIPES

page 51–55

PVC-O pipes are the best solution for use in water supply networks operating under high and medium pressure, irrigation systems, fire suppression systems and pump systems, as well as in other areas. So we should create a equipment for making such pipes with providing optimal process parameters.

Established equipment receipt of polyvinyl chloride pipe, consists of:

— Device-drawn tubes;
— A device for forming a second outer diameter;
— External calibration device diameter pipes.

As a result of researches the optimal values of process parameters are made such as speed-drawn, temperature of the pipe that leads to the relaxation of stresses in the PVC-O pipe, when it made; it is determined that stress relaxation in the pipe in the production of PVC-O pipes is faster with minimal speed of haul-off, so use of vacuum bath after a conical mandrel is not necessary, but using the fact that the rate of release of pipes should be sufficient to industrial scale, of course vacuum bath should be applied.

This study is useful in that project organization guided by research data can to design the minimum required equipment for the manufacture of PVC-O pipes.

Keywords: polymer material, PVC-O, PVC pipes, PVC, stress relaxation, speed drawing, strain gauges, sensor, temperature.

References

1. *DSTU B.V.2.7-147:2007. Unplasticized Polyvinyl Chloride Pipes and Shapes to Fit Them for Cold Water Supply. Specifications.* (2007). The

National Standard of Ukraine. Kyiv: The Ministry of the Regional Development and construction, 88.
2. *ISO 9969:1995. Thermoplastics pipes — Determination of ring stiffness*. Available: http://dx.doi.org/10.3403/00487717
3. *EN 744: 1995. Plastics piping and ducting systems. Thermoplastics pipes. Determination of resistance to external blows by the staircase method*. Available: http://dx.doi.org/10.3403/00650491
4. *EN 1452-1:1999. Plastics piping systems for water supply. Unplasticized poly (vinyl chloride) (PVC-U). General*. Available: http://dx.doi.org/10.3403/02151876
5. Tugov, I. I., Kostrykina, G. I. (1989). *Chemistry and Physics of Polymers*. Moscow: Khimiya, 432.
6. Guzeev, V. V. (1979). *Study and Development of Polymer Composites on the Basis of Polyvinyl Chloride*. Moscow, 36.
7. Minsker, K. S., Zaikov, G. E. (2001). Achievements and Objectives of the Research in Aging and Stabilization of PVC. *Plastic Mixtures, 4*, 27–35.
8. Wilky, Ch., Sammers, J., Daniels, Ch.; Translated from English: Zaikov, G. E. (2007). *Polyvinyl Chloride*. St. Petersburg: Professiya, 728.
9. Volodin, V. P. (2010). *Extrusion of Plastic Tubes and Shapes*. St. Petersburg: Professiya, 240.
10. Willowby, D. (2010). *Polymer Pipes and Pipelines*. St. Petersburg: Professiya, 485.
11. Robeyns, J., Vanspeybroeck, P. (2005, September). Molecular-oriented PVC (MOPVC) and PVC-U pipes for pressure applications in the water industry. *Plastics, Rubber and Composites, Vol. 34, № 7*, 318–323. doi:10.1179/174328905x59782

THE JUSTIFICATION OF NATIONAL TECHNICAL REGULATION SYSTEM AND ITS TRANSFORMATION INTO EUROPEAN SYSTEM

page 56–60

The national technical regulation system to improve its efficiency in the transformation to the European system is reviewed and analyzed in the article. The requirements of the Directives of New (standardization) and Global (certification) approaches to strategy harmonization of national technical regulations are analyzed. During the study and analysis it is found that the technical regulation system in Ukraine is more complicated, inefficient and binding, it differs significantly from certification, standardization of the European system. The main barriers to full integration of Ukraine into the international economic system are also defined. Requirements of Directive 2006/42/EC, which regulates the design, construction, conformity assessment and placing on the market of machines and mechanisms are considered. The transformation of the national technical regulation system will ensure the elimination of technical barriers to trade between Ukraine and the EU by establishing a mechanism of self-regulation of a single European market, increase the competitiveness of domestic industry in the domestic and foreign markets, expand the boundaries of marketing, and also improve the quality and reduce the risk in relation to consumer usage of this product. The proposed strategy of harmonizing national technical regulation system to the European will improve the effectiveness of the system, promote the development of the national economy and enterprises, improve the competition, ensure consumer protection and eliminate unnecessary technical barriers to trade.

Keywords: information, Ukraine-European Union Association Agreement, technical regulation system, European standards (EN).

References

1. *Soglashenie ob assotsiatsii mezhdu Ukrainoi, s odnoi storony, i Evropeiskim Soiuzom, Evropeiskim Soobshchestvom po Atomnoi Energetiki i ih gosudarstvami-chlenami, s drugoi storony*. (2012, March 30). Available: http://euroua.com/association/
2. Valaha, L. Yu. (2014). Efektyvnist adaptatsii natsionalnoi systemy tekhnichnoho rehuliuvannia u vidpovidnist do vymoh Yevropeiskoho Soiuzu. *Visnyk Kyivskoho natsionalnoho universytetu tekhnolohii ta dyzainu, 1*, 235–243.
3. Vitkin, L., Lutsenko, D. (2013). Model reformuvannia systemy standartyzatsii Ukrainy v konteksti mizhnarodnykh zoboviazan ta neobkhidnosti modernizatsii ekonomiky. *Standartyzatsiia. Sertyfikatsiia. Yakist, 3*, 3–12.
4. *Harmonizatsiia tekhnichnoho rehuliuvannia, standartiv ta otsinky vidpovidnosti, uhoda pro otsinku vidpovidnosti ta pryiniatnist promyslovykh tovariv*. (2013). Instytut ekonomichnykh doslidzhen ta politychnykh konsultatsii. Available: http://www.ier.com.ua/ua/Ukraine_EU_project/materials/AA_title_4/barriers/harmonisation/
5. Zaloha, V. O., Diadiura, K. O., Nahornyi, V. V. (2012). *Spadkovi pryntsypy formuvannia yakosti skladnykh mashynobudivnykh vyrobiv*. Sumy: Sumskyi derzhavnyi universytet, 347.
6. Varnalii, Z. S., Burkaltseva, D. D., Saienko, O. S. (2011). *Ekonomichna bezpeka Ukrainy: problemy ta priorytety zmitsnennia*. K.: Znannia Ukrainy, 299.
7. Piatnytskii, V. (29.04.2014). Bahato ukrainskykh vyrobnykiv vzhe zaraz hotovi eksportuvaty svoi tovary do YeS. *Uriadovyi portal: yedynyi Veb-portal orhaniv vykonavchoi vlady*. Available: http://www.kmu.gov.ua/control/uk/publish/article?art_id=247257688&cat_id=244277212.
8. Pro standartyzatsiiu. *Zakon Ukrainy vid 17.05.2001 № 2408-III*. Available: http://zakon4.rada.gov.ua/laws/show/2408-14
9. Pro pidtverdzhennia vidpovidnosti. *Zakon Ukrainy vid 17.05.2001 № 2406-III*. Available: http://zakon4.rada.gov.ua/laws/show/2406-14
10. Pro akredytatsiiu orhaniv z otsinky vidpovidnosti. *Zakon Ukrainy vid 17.05.2001 № 2407-III*. Available: http://zakon4.rada.gov.ua/laws/show/2407-14
11. Pro tekhnichni rehlamenty ta protsedury otsinky vidpovidnosti. *Zakon Ukrainy vid 01.12.2005 № 3164-IV*. Available: http://zakon4.rada.gov.ua/laws/show/3164-15
12. Pro zatverdzhennia Tekhnichnoho rehlamentu moduliv otsinky vidpovidnosti. *Postanova Kabinetu Ministriv Ukrainy vid 07.10.2003 № 1585*. Available: http://zakon4.rada.gov.ua/laws/show/1585-2003-п